Megohmmeters
Model 1020
Model 1025

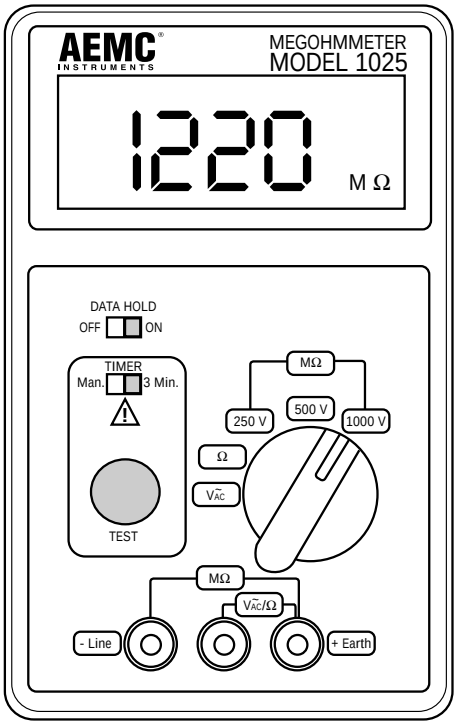
AEMC® INSTRUMENTS

Chauvin Arnoux, Inc. d.b.a. AEMC® Instruments

99-MAN-100110 Rev 02 06/97

Megohmmeters
Model 1020
Model 1025

USER MANUAL



AEMC® INSTRUMENTS

Owner's Record

The serial number for the Megohmmeter Model 1020 or Model 1025 is located on the back of the instrument. Please record this number and purchase date for your records.

MEGOHMMETER MODEL 1020

CATALOG # 2111.91

SERIAL #: _____

PURCHASE DATE: _____

DISTRIBUTOR: _____

MEGOHMMETER MODEL 1025

CATALOG # 2111.87

SERIAL #: _____

PURCHASE DATE: _____

DISTRIBUTOR: _____

99-MAN-100110
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AEMC® Instruments
by Chauvin Arnoux, Inc.

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Warning

These safety warnings are provided to ensure the safety of personnel and proper operation of the instrument.

- Read this instruction manual completely before attempting to use or service this instrument and follow all safety information.
- Safety is the responsibility of the operator!
- Tests are to be carried out only on dead circuits! Check for live circuits before making resistance measurements (safety check).
- Always make connections from the instrument to the circuit under test.
- The Megohmmeter Models 1020 and 1025 are sources of high voltage, as is the sample connected to them. All persons performing or assisting in the tests must employ all safety precautions to prevent electrical shock to themselves and to others.
- AEMC® considers the use of rubber gloves to be an excellent safety practice even if the equipment is properly operated and correctly grounded.
- When testing capacitance samples, make sure that they have been properly discharged and that they are safe to touch. Dielectric insulation samples should be short-circuited for at least five times the amount of time they were energized.
- Never open the back of the instrument while connected to any circuit or input.

International Electrical Symbols

This symbol signifies CAUTION! and requests that the user refer to the user manual before using the meters.

Receiving Your Shipment

Upon receiving your shipment, check to be sure that the contents agree with the packing slip. Notify your distributor at once of any shortages. If the equipment appears to be damaged, file a claim immediately with your carrier, and notify your distributor at once, giving a detailed description of the damages. Save the damaged packing container to substantiate your claims.

Packaging

Megohmmeters Model 1020 (Cat. #2111.91) and Model 1025 (Cat. #2111.87) are shipped with a carrying case, two color-coded leads, six 1.5 V “AA” batteries, and an instruction manual.

Description

Model 1020 and Model 1025 are compact, light-weight, battery-operated, digital megohmmeters. The Model 1020 tests at 250 V and 500 V up to 200 MΩ. The Model 1025 adds an additional voltage range of 1000 V, and measures up to 2000 MΩ.

The Models 1020 and 1025 also feature a continuity test range with an audible beeper for resistances under 100Ω, and a 600 V AC range for safety voltage check.

The press-to-test button has an associated locking feature for continuous tests up to three minutes, eliminating the need to hold down the button manually.

Other features include a large 3-1/2 digit LCD, automatic zero, data hold switch, and low battery indicator. These light-weight, easy-to-use megohmmeters can be used for most commonly performed insulation tests, such as on cables, switch gear, motors, DC generators, power tools, and small appliances.

The Models 1020 and 1025 include test leads, batteries, carrying case, and user manual.

Models 1020/1025 Features

- Model 1020 measures insulation at 250 and 500 V.
- Model 1025 measures insulation at 250, 500, and 1000 V.
- Continuity test
- Continuity beeper
- 600 V AC safety test voltage range
- Large, easy-to-read digital display
- Data hold switch
- Three-minute “lock-on” test button for hands-free operation
- Automatic discharge when test button is released
- Low battery indication

Models 1020/1025 Specifications

ELECTRICAL SPECIFICATIONS

INSULATION TESTS

DC Test Voltage:
250 V and 500 V (Model 1020)
250, 500, 1000 V (Model 1025)

Megohm Range:
0.1 to 200 MΩ (Model 1020 and 1025)
1 to 2000 MΩ (Model 1025 @ 1000 V)

Resolution:
250 and 500 V : 0.1 MΩ
1000 V : 1 MΩ

Short Circuit Current:
0.4 mA max. at 250 V
0.9 mA max. at 500 V
1.7 mA max. at 1000 V

Accuracy:*
0.1 to 1000 MΩ: 3% of reading ± 3 digits
1000 to 2000 MΩ: 5% of reading ± 3 digits (Model 1025 only)

Test Voltage Generation:
Solid state circuitry generating test voltage (± 10%).

RESISTANCE TESTS (Ω)

Range: 0.1 to 200Ω

Accuracy:* 1% of reading ± 2 digits

Maximum Open Circuit Voltage: 3.3 V

Overload Protection: 500V DC/AC

**Accuracies are at 23° C ± 5° C, below 80% RH*

CONTINUITY TESTS (Ω)

Range: 0 - 100Ω (with •ıll display and beeper)

Resolution: 0.1Ω

Operation Resistance: < 100Ω

Max. Open Circuit Voltage: 3.2 V

Overload Protection: 500 V DC/AC

VOLTAGE TESTS SAFETY CHECK ($V_{\widetilde{AC}}$)

Range: 0 - 600 V AC

Resolution: 1 V

Accuracy:* 0.8% of reading ± 3 digits

Input Impedance: 10 MΩ

GENERAL SPECIFICATIONS

Power Supply: Six 1.5 V “AA” batteries

Low Battery Indication: Indicator on LCD

Display: 3-1/2 digit LCD, 0.65” height

Overrange Indicator: Highest digit of (1) displayed

Operating Temperature: 32° to 104°F (0° to 40°C)

Storage Temperature: 14° to 140°F (-10° to 60°C)

Operating Humidity: 0 - 80% RH

Storage Humidity: 0 - 70% RH

Dimensions: 6.5 x 3.9 x 2.2” (165 x 100 x 57mm)

Weight: 1.1 lb (500 g) approx.

**Accuracies are at 23° C ± 5° C, below 80% RH*

Model 1020

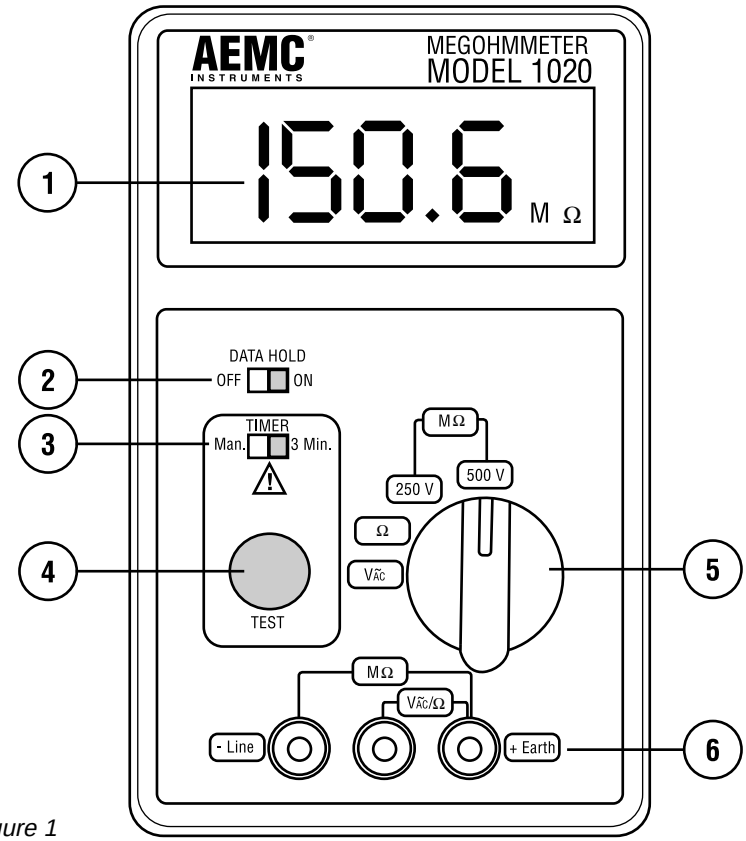

Figure 1

1. Digital Display
2. Data Hold Switch
3. Manual and Lock Switch (locks power on for 3 minutes)
4. Press-to-Test Button
5. Range Selector Switch
6. Test Terminals

Model 1025

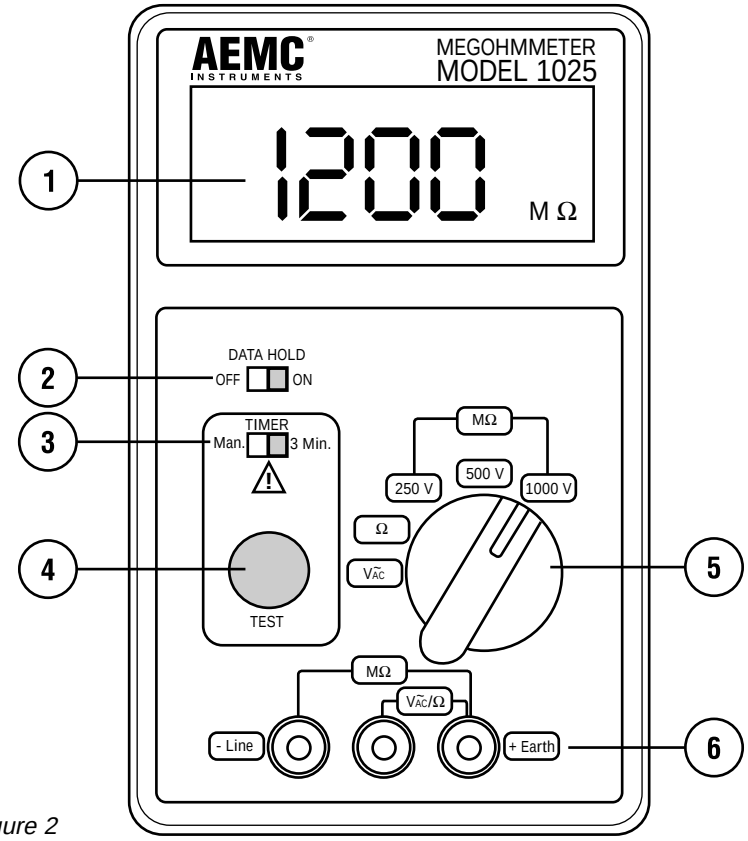

Figure 2

1. Digital Display
2. Data Hold Switch
3. Manual and Lock Switch (locks power on for 3 minutes)
4. Press-to-Test Button
5. Range Selector Switch
6. Test Terminals

Safety Check - Voltage Test

NOTE: Make sure the jacks are firmly inserted into the megohmmeter prior to performing any electrical tests!

Before measuring insulation resistance, confirm that the sample is fully discharged (particularly in dielectric and capacitance samples), and that the sample is not connected to an energized circuit. To perform the voltage test:

1) Insert the red lead into the +earth position and the black lead in the middle jack position.

2) Set the range selection switch to the VAC position.

3) Connect to the sample under test.

4) Press the test button.

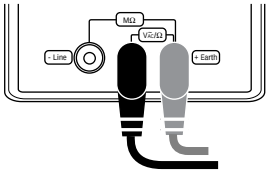

Figure 3

Insulation Resistance Testing (MΩ Range)

After checking for a live circuit (see Safety Check), connect the megohmmeter. See Figures 4 through 11 for examples.

TEST VOLTAGE

No published standard tells which voltage to choose for any given winding. However, published recommendations are summarized as follows:

Rated Voltage of Motor	Test Voltage
Below 115	250 V
115	250 V or 500 V
230	500 V
460	500 V or 1000 V

SPOT TESTING

As a general rule in spot testing, test voltage should be applied until no variation in reading is noted for 15 seconds, or applied for a fixed 60 seconds. What minimum value should be measured? The IEEE standard No. 43-1974 states that it is impossible to specify the value of insulation resistance at which a winding will fail electrically, but on motors, minimum readings generally stated are:

Rated Voltage	R Minimum
250 or less	2 MΩ
460	2 MΩ

There is no fixed figure for determining what is good and bad in resistance readings, but a good guide would be 1 megohm for every 100 applied operating volts, as a minimum figure. This applies to motors and transformers. When the insulation resistance gets this low, an electrical breakdown can be expected at any time, and rewinding or replacing should be considered.

It is not unusual for a winding to be 10 to 100 times the recommended minimum value (IEEE standard 43-1974: Recommended Practice for Testing Insulation Resistance of Rotating Machinery), but this varies with temperature and humidity.

RATIO TESTING

In time resistance testing (Dielectric Absorption Ratio), readings are taken at 30 and 60 seconds to obtain the dielectric absorption ratio.

$$\frac{\text{Insulation resistance @ 60s}}{\text{Insulation resistance @ 30s}} = \text{Dielectric Absorption Ratio (DAR)}$$

This test is useful to increase the accuracy of spot testing. In general, a ratio of 1.5 or better should be required. A ratio below this indicates that repair is probably needed.

Remember, a DC insulation test may be used for acceptance testing, but is more commonly used to check the gradual deterioration of equipment over its life. Consult your equipment manufacturer for specific test or test voltage if not known.

Insulation resistance decreases with moisture, temperature and age and should be recorded over time at a given temperature and corrected.

FOR SUCCESSFUL INSULATION RESISTANCE TESTING

- Check with the equipment manufacturer for factory insulation resistance readings.
- Do not rely on insulation resistance testing alone as proof of winding conditions.
- Do not expect the same value for all parts of all machines.
- Observe consistent test time duration, recognizing that total current through insulation under test will vary with time.
- Correct all readings properly to a standard reference temperature (see IEEE Std. #43-1974, Temperature Correction Curve).
- Know what you are testing. Isolate the piece of equipment from other circuitry.
- Watch trends rather than relying on single “spot” readings.

INSULATION MEASUREMENT - CONNECTIONS

Figure 4 shows the connections to measure the insulation of one conductor to the other conductors. The cable should be disconnected at both ends to avoid leakage through switchboards and panels.

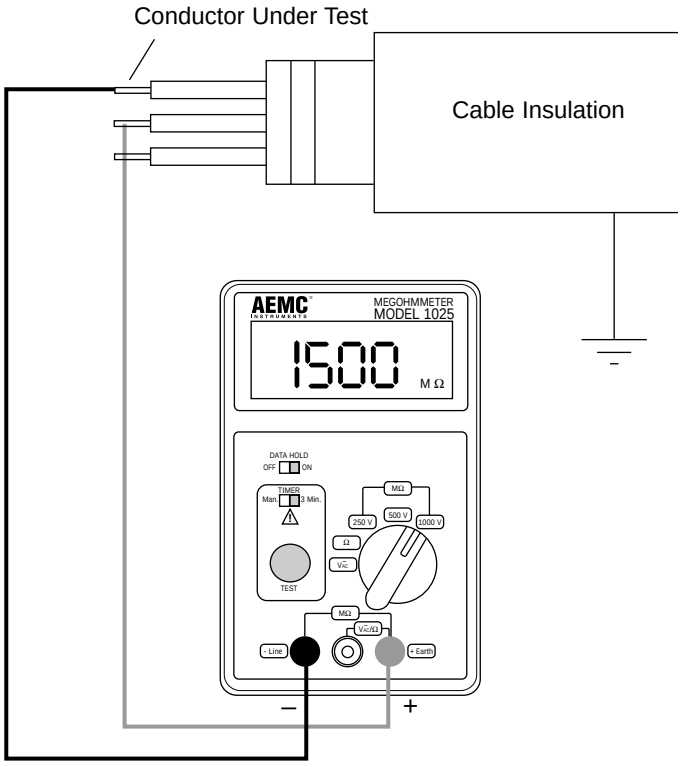

Figure 4

Figures 5 and 6 show the connections for testing insulation from a supply conductor to ground (motor frame).

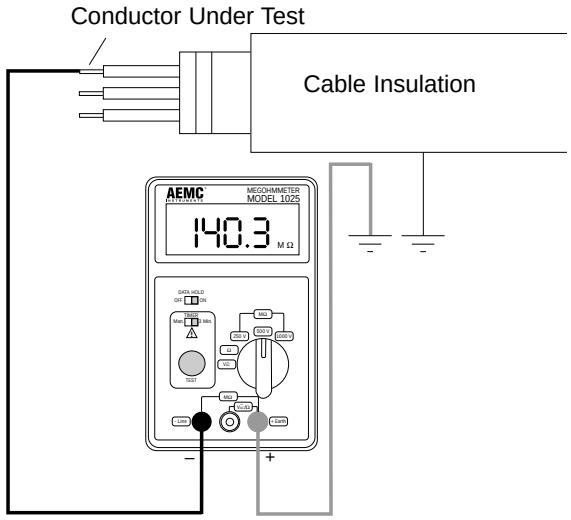

Figure 5

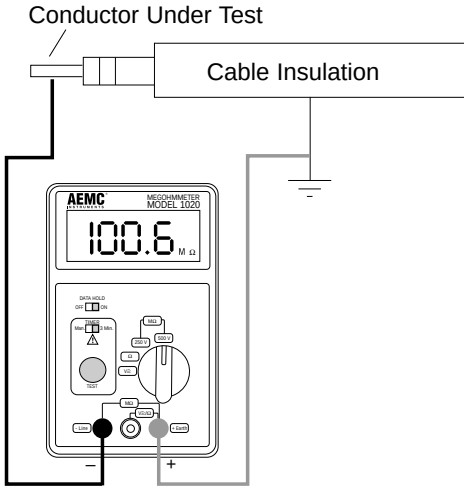

Figure 6

Figure 7 shows the connections to a transformer (lighting or distribution). Make sure that the switches and/or circuit breakers on both sides are open. Check the high voltage winding to ground, low voltage to ground, and the resistance between them with no winding grounded.

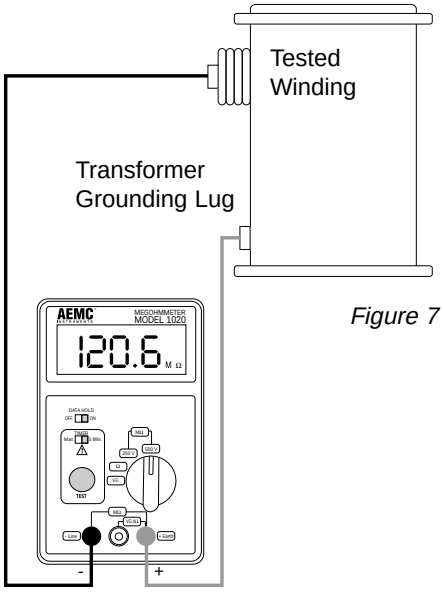

Figure 7

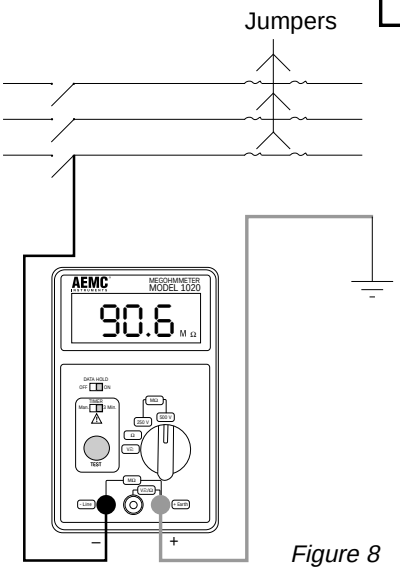

Figure 8

Figure 8 shows the connections for measuring the insulation of a three-phase line to ground by connecting the jumpers between phases. This gives a reading of all conductors at once. If a load such as a motor, heater, etc., is attached to the other end of the line, it will read the load resistance to ground at the same time. By removing the jumpers, readings can be made between the individual conductors and ground.

INSULATION RESISTANCE MEASUREMENTS ON MOTORS

Figure 9 shows reading the resistance to ground of a three-phase motor winding. Since the three-phase motors are internally connected, it is only necessary to connect one lead to the motor lead and the other lead to the motor frame as shown.

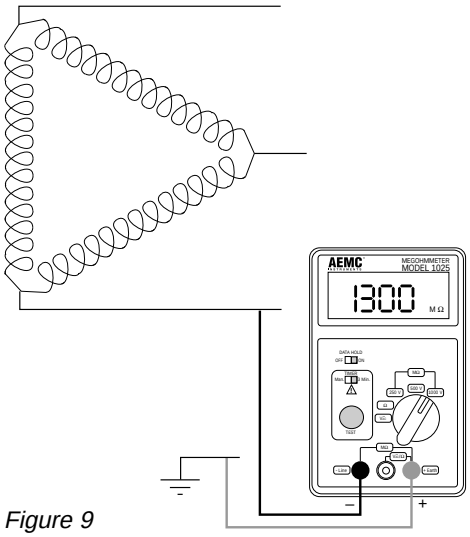

Figure 9

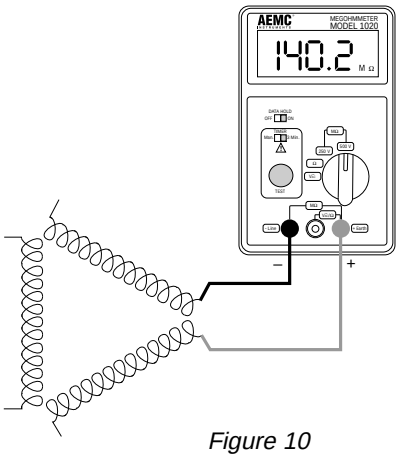

Figure 10

Figure 10 shows the windings of a three-phase motor separated. Sometimes this can be done at the lead terminals, while other times the end bells must be removed to get at the lead wires of the coils. By connecting the megohmmeter as shown, the phase insulation resistance value can now be determined. Read between phases “A” and “B”, then “B” and “C”, then “C” and “A”.

Figure 11 shows connections for testing insulation from a supply conductor in a switch-box to ground (motor frame). An identical test may be carried out from the motor starter.

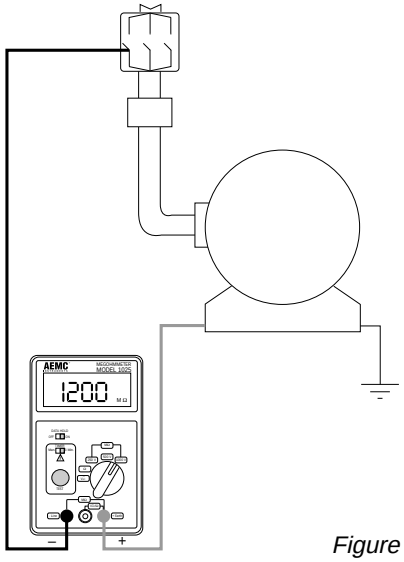

Figure 11

Continuity Measurements

Once it has been verified that no voltage is present, the continuity check may be performed.

Set the switch to the Ω position.

Connect the red lead in the +earth position and the black lead in the middle jack position.

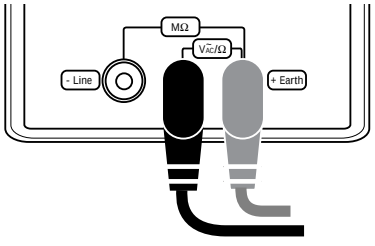

Figure 12

When the resistance is less than 100Ω it will be indicated by a continuous beeper.

If an open circuit has been detected the display will read:

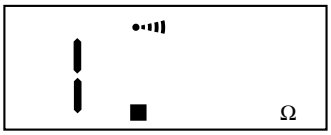

Figure 13

Resistance Measurements

Set the switch to the Ω position.

Connect the red lead in the +earth position and the black lead in the middle jack position.

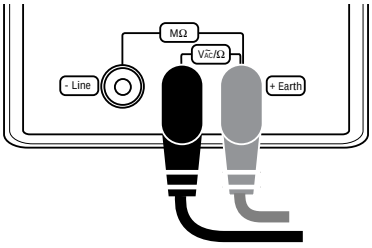

Figure 14

The instrument has a measurement range of 0.1 to 200Ω

Connect the leads to the device under test.

If an open circuit has been detected the display will read:

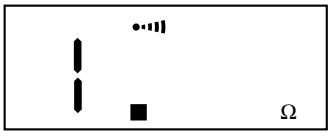

Figure 15

Data Hold

Will hold last measured value in memory when the Data Hold position is in the “ON” position. NOTE: You must hold down the yellow test button to keep the value displayed. The value in memory will still be displayed if leads are disconnected as long as the yellow test button is depressed.

Timer

The instrument may be used in a “hands-free operation” by moving the timer switch to the three minute position and then pressing the yellow test button. If the yellow test button is pressed when the switch is in the three minute position it will shut the instrument off. NOTE: After three minutes all data will be lost! If a DAR (Dielectric Absorption Ratio) test is performed the user will have to record the value after 30 seconds and 60 seconds.

$$\frac{\text{Insulation resistance @ 60s}}{\text{Insulation resistance @ 30s}} = \text{Dielectric Absorption Ratio (DAR)}$$

CAUTION: The timer will keep the output leads energized for three minutes. After three minutes the display will go blank and all measured data will disappear.

This instrument was not designed to perform a Polarization Index (PI) Test because the test voltage cannot be locked for 10 minutes. If a PI Test is required, the user will have to hold down the test button and record the readings at 1 minute and 10 minutes.

$$\frac{\text{Insulation resistance @ 10 min}}{\text{Insulation resistance @ 1 min}} = \text{Polarization Index (PI)}$$

Maintenance

Battery Replacement

Replace batteries only when the megohmmeter is not connected to a sample and OFF. (including Timer to Man. position).

When battery voltage is not sufficient the low “BT” symbol will be displayed.

Remove the screw from the middle of the instrument and remove the back cover.

Replace the 6 “AA” batteries.

Reinstall the back cover and screw to secure the back cover.

Repair and Calibration
(North/South America, Australia, New Zealand)

To guarantee that your instrument complies with the factory specifications, we recommend that the Megohmmeter Models 1020 and 1025 be submitted to our factory service center at one year intervals for recalibration, or as required by other standards.

For instrument repair and/or calibration, please call our USA factory, toll-free, at (800) 945-AEMC (800)-945-2362):

Chauvin Arnoux, Inc.
d.b.a. AEMC® Instruments
15 Faraday Drive
Dover, NH 03820 USA
Tel: (800) 945-2362
(603) 749-6434
Fax: (603) 742-2346
www.aemc.com

(Or contact your authorized distributor.)

Repair and Calibration
(Europe, Asia, Africa)

To guarantee that your instrument complies with the factory specifications, we recommend that the Megohmmeter Models 1020 and 1025 be submitted to our factory service center at one year intervals for recalibration, or as required by other standards.

For instrument repair and/or calibration, please call our French factory:

Manumesure - Reux
14130 Pont l'Evêque
France
Tel: (33) 2 31 64 51 43
Fax: (33) 2 31 64 51 09
www.aemc.com

(Or contact your authorized distributor.)

Technical and Sales Assistance
(North/South America, Australia, New Zealand)

If you are experiencing any technical problems, or require any assistance with the proper use or application of this instrument, please call our technical hotline:

Chauvin Arnoux, Inc.
d.b.a. AEMC® Instruments
200 Foxborough Blvd.
Foxborough, MA 02035 USA
Tel: (800) 343-1391
(508) 698-2115
Fax: (508) 698-2118
www.aemc.com

Technical and Sales Assistance
(Europe, Asia, Africa)

If you are experiencing any technical problems, or require any assistance with the proper use or application of this instrument, please call our technical hotline:

Chauvin Arnoux
190, rue Championnet
75876 Paris Cedex 18 - France
Tel: (33) 1 44 85 44 57
Fax: (33) 1 46 27 95 59
www.aemc.com

Limited Warranty

The Megohmmeter Models 1020 and 1025 are warranted to the owner for a period of 1 year from the date of original purchase against defects in manufacture. This limited warranty is given by AEMC® Instruments, not by the distributor from whom it was purchased. This warranty is void if the Megohmmeter Model 1020 or 1025 has been tampered with, abused or if the defect is related to service not performed by AEMC® Instruments.

What AEMC® Instruments Will Do: If a malfunction occurs within the 1 year period, you may return the Megohmmeter Model 1020 or 1025 to us for repair or replacement free of charge, provided we have your REGISTRATION CARD on file. AEMC® Instruments will, at its option, repair or replace the faulty material.

Note: If a card is not on file, we will require a dated proof of purchase as well as your REGISTRATION CARD accompanied by the defective material.

What You Must Do: First obtain a return authorization by phone or by fax from AEMC® Instruments, then return the Megohmmeter Model 1020 or 1025, indicating place and date of purchase, with a written explanation of the reason for return. Return material, postage pre-paid to:

Chauvin Arnoux, Inc.
d.b.a. AEMC® Instruments
Service Department
15 Faraday Drive
Dover, NH 03820 USA
Tel: (800) 945-2362
(603) 749-6434
Fax (603) 742-2346

Caution: To protect against in-transit loss, we recommend you insure your returned material.

For full warranty coverage, please read the Warranty Card which is affixed to the Warranty Registration Card. Please keep the Warranty Card with your records.

NOTES